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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
|-----------------|-------------|----------------------|---------------------|------------------|

10/551,212

09/28/2005

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7885-104/10811046

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167 7590 04/01/2009
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EXAMINER

SINGH, PREM C

ART UNIT

PAPER NUMBER

1797

MAIL DATE

DELIVERY MODE

04/01/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|--|--|
| Office Action Summary | Application No. 10/551,212 | Applicant(s) BEREZUTSKIY, VLADIMIR MIKHAILOVICH | |
| | Examiner PREM C. SINGH | Art Unit 1797 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-61 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-61 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date <u>09/28/2005, 01/22/2009</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 2, 5-9, 41, 44 and 47 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Claim 2: The statement "...wherein a liquid medium is preliminary fractionated..." makes the claim indefinite. It is not clear whether the fractionation is done before or after the adsorption step.

It is examiner's understanding that the claim is drawn to a process of taking a hydrocarbon feed with impurities, fractionating the hydrocarbon stream into different fractions with varying concentrations of the impurities, then taking individual fractions to the adsorption step.

4. Claims 5-9 recite the limitation "the host liquid media" in claim 1. There is insufficient antecedent basis for this limitation in the claim.
5. Claim 41 recites the limitation "the reduced valance catalyst metal components" in claim 26. There is insufficient antecedent basis for this limitation in the claim.
6. Claim 44 recites the limitation "the carbon with the metal compound" in claim 24. There is insufficient antecedent basis for this limitation in the claim.

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7. Claim 47 recites the limitation "the ion exchange of catalyst ions" in claim 46.

There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 1, 2, 4, 6, 8, 13-15, 17, 18, 20-40, 42, 43, and 50-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piccoli et al (US Patent 6,118,037) in view of Wismann et al (WO 01/42392 A2).

10. With respect to claim 1, Piccoli discloses a method for treatment of liquid media, which includes adsorption of impurities contained in a liquid medium by a sorbent,

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separation and removal of impurities adsorbed (See column 2, lines 40-47, 62-67), while separation and removal of the adsorbed compound is executed by washing the particulate catalyst impregnated sorbent with a polar solvent and regeneration of the sorbent carried out with heat and/or by the blowing through a hot gas (See column 2, lines 58-61; column 3, lines 7-16).

Piccoli invention does not specifically disclose oxidation of impurities.

Wismann discloses a process similar to Piccoli for treatment of hydrocarbon liquids using an adsorbent (See title and abstract). Wismann also discloses removal of mercaptan sulfur from petroleum distillates by sorption or simultaneous sorption and oxidation (See page 1, lines 7-8). Wismann further discloses that as the mercaptan enters the pores, oxygen from air or some other source, also enters the pores and attacks the mercaptan to convert it to disulfide, which is highly soluble in oil within the pore. This allows a concentration gradient allowing influx of the mercaptan into pores and outflux of disulfides out with the distillate to produce sweet distillate product (See page 3, lines 1-6).

Thus, it would have been obvious to one skilled in the art at the time of invention to modify Piccoli invention and add an oxidizing step as disclosed by Wismann to enhance removal of mercaptan sulfur from the distillate product.

11. With respect to claim 2, Piccoli discloses that the streams consist of hydrocarbons characterized by an initial and final boiling point, as in the case of fuel (See column 3, lines 48-53). Piccoli also discloses that the streams contain varying

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quantities of contaminants belonging to the above groups, approximately however, of a thousand ppm (See column 3, lines 53-55).

Wismann discloses the fractions as petroleum distillates such as gasoline, naphtha, jet fuel, kerosene, diesel fuel or fuel oil (See page 1, lines 12-13; page 3, lines 17-19). It is known to those skilled in the art that the petroleum distillates disclosed by Wismann are obtained by fractionation of crude oil.

12. With Respect to claim 4, Piccoli invention does not specifically disclose separation of oxides by distillation, however, the invention does disclose washing step using polar solvents (See column 3, lines 7-19) and desorption of the adsorbed contaminant (See column 4, lines 9-12). Obviously, the solvent is carrying the adsorbed impurities.

Wismann discloses use of oxygen in the adsorption process as claimed. Thus, the impurities in Wismann process should necessarily be converted to oxides as claimed.

Thus, it would have been obvious to one skilled in the art at the time of invention to modify Piccoli invention and separate the adsorbed oxides of contaminants from the solvent by an appropriate device, including a distillation step as claimed, for recycle of the solvent.

13. With Respect to claims 6 and 8, Piccoli invention discloses host liquid to be hydrocarbon streams of varying composition and origin (See column 1, lines 10-11;

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column 2, lines 63-64; column 3, lines 48-55). It is to be noted that hydrocarbons from different origins comprise petroleum, and other carbonaceous liquids for example, shale and tar. Obviously, hydrocarbon streams disclosed by Piccoli encompass hydrocarbon byproducts and other carbonaceous liquids.

14. With respect to claims 13, 15, 17 and 18, Piccoli invention discloses non-metallic solid impurities comprising nitrogen compounds, sulfur compounds like mercaptans, benzothiophenes, thiophenes, dialkylsulfides (See column 3, lines 34-47) and aromatic hydrocarbons (See column 3, lines 48-53). It is to be noted that aromatic hydrocarbons encompass poly nuclear aromatics, as claimed.

15. With respect to claim 14, Piccoli invention discloses host liquid media consisting of hydrocarbons having 3 to 8 carbon atoms comprising paraffins, olefins, diolefins and aromatics characterized by an initial and final boiling point as in the case of a fuel (See column 3, lines 48-55). Piccoli further discloses a fuel cut with a final temperature of 225°C and T₉₀ of 190°C (See column 7, lines 14-24). Obviously, Piccoli is disclosing a gasoline fraction.

16. With respect to claims 20-23, Wismann invention discloses that oxidizing agents are selected from the group consisting of air, oxygen and hydrogen peroxide (See claim 7). Wismann also discloses that oxygen from any source can be used (See page 3, lines 1-2). Although Wismann does not specifically disclose using ozone, it is expected

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that any oxygen source, including ozone, should be equally effective in the oxidation process.

17. With respect to claim 24, Wismann invention discloses oxidation in presence of a particulate catalyst impregnated sorbent (See page 2, lines 23-26).

18. With respect to claim 25, Wismann invention discloses sparging oxygen containing gas in the form of fine bubbles (See page 3, lines 8-11). It is to be noted that fine bubbles should necessarily be micron size.

19. With respect to claims 26-40, 42, and 43, Piccoli invention discloses using an adsorber essentially consisting of silica gel modified with one or more metals from the elements of Group IV b, V b, VIII, I b, II b or from tin, lead or bismuth, preferably selected from zinc, iron, molybdenum, vanadium, tungsten, tin, platinum, copper and chromium (See column 2, lines 66-67; column 3, lines 1-5). Piccoli also discloses that the quantity of metals specified above is between 0.001 and 5 wt% with respect to the end catalyst.

Wismann discloses using commercially available activated carbon or catalyst impregnated carbon (See page 2, lines 25-26; page 4, lines 5-9).

Although, Piccoli invention does not specifically disclose the ratio of metals in the catalyst system, however, the invention does disclose one or more metals and the total percentage between 0.001 to 5 wt%. Also, since the ratio of metals in the finished

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catalyst is a result-effective variable, it is expected to be optimized by one skilled in the art by routine experimentation. See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

20. With respect to claims 50-59, Piccoli discloses, "In the washing step, such as polar solvents, water, acetone, methanol, ethyl acetate, or their mixtures, such as hydrocarbons, paraffins with from 5 to 8 carbon atom, or aromatic, can be used" (Column 3, lines 13-16). Although Piccoli invention does not specifically disclose using ethanol, dichloroethane, dichloromethane, dichlorobenzene, however, it is to be noted that these solvents and their combinations are obvious variants of the disclosed solvents.

21. With respect to claims 60 and 61, Piccoli invention discloses that the impregnation is carried out and the water is removed by gently heating the solid under movement (See column 5, lines 8-10). Piccoli also discloses adsorption step at a temperature of 0 to 150°C and a regeneration step by means of thermal treatment in a stream of inert gas, at a temperature ranging from 100 to 200°C (See column 2, lines 40-47). Thus, it would have been obvious to one skilled in the art at the time of invention to modify Piccoli invention and specify the temperature in the drying step. It is expected that the temperature in the drying step will be in a range, including as claimed, because it should necessarily be lower than the temperature in the regeneration step in order to

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maintain catalytic activity. Piccoli's heating of solid under movement should have similar effect as that of blowing a hot gas during heating.

22. Claims 3, 9, 19, 45-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piccoli et al (US Patent 6,118,037) in view of Wismann et al (WO 01/42392 A2) and further in view of Fleck et al (US Patent 2,925,381).

23. With Respect to claim 3, 9 and 19, Piccoli invention does not specifically disclose additional purification step(s), however, the invention does disclose an embodiment in which a percentage removal for sulfur and nitrogen is 25.9% and about 98% respectively (See Example 20). Piccoli also does not specifically disclose coal liquids.

Fleck discloses a process similar to Piccoli for removal of organic nitrogen compounds from hydrocarbons using a sorbent (See title and column 1, lines 15-19). Fleck also discloses that by using one or more contacting stages a virtually nitrogen free hydrocarbon product, that is, one having a zero nitrogen analysis, can be obtained (See column 2, lines 61-66; column 4, lines 9-13).

Thus, it would have been obvious to one skilled in the art at the time of invention to modify Piccoli invention and add additional purification stage(s) produce hydrocarbon products with reduced nitrogen and sulfur.

Piccoli invention discloses host liquid to be hydrocarbon streams of varying composition and origin (See column 1, lines 10-11; column 2, lines 63-64; column 3,

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lines 48-55). It is to be noted that hydrocarbons from different origins comprise petroleum, and other carbonaceous liquids for example, shale and tar.

Fleck discloses using hydrocarbons including petroleum, coal tar oil fractions and shale oils among others (See column 1, lines 17-19, 46-50).

With respect to claims 45-47, Piccoli invention discloses the use of 13X zeolite as a sorbent, however, the invention does not specifically disclose the pore size of the zeolite.

Fleck discloses use of 10 X and 13X zeolites having pore diameters averaging 10 Å and 13 Å, respectively (See column 3, lines 74-75; column 4, lines 1-5). Although Fleck invention does not specifically disclose the percentage ion-exchange of faujasite, it is expected that Fleck's invention should necessarily be achieving ion exchange of zeolite in the claimed range because both are using zeolite X with pore diameters more than 10 Å (evidenced by Kimberlin et al , US Patent 3,686,121; column 3, lines 51-57; column 4, lines 19-44).

24. Claims 5, 7, 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piccoli et al (US Patent 6,118,037) in view of Wismann et al (WO 01/42392 A2) and further in view of Valyocsik (US Patent 5,527,981).

25. With Respect to claims 5, 7, 10 and 11, Piccoli invention does not specifically disclose water and other polar aqueous liquids as a host liquid and hydrocarbons as the contaminants.

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Valyocsik discloses a process similar to Piccoli for separating at least one component from a mixture of components using a sorbent (See column 1, lines 14-19; column 4, lines 50-67; column 5, lines 49-65; column 8, lines 58-63). Valyocsik also discloses host liquid as water and a hydrocarbon component as the contaminant (See column 8, lines 51-60). Since other polar aqueous liquids (for example: acetone, methanol, ethyl acetate or their mixtures: See Piccoli; column 3, lines 13-16) can be in a mixture with another hydrocarbon as per Valyocsik, it would have been obvious to one skilled in the art at the time of invention to modify Piccoli invention and use water or any other polar aqueous liquid as the host liquid and a hydrocarbon stream as the contaminant as disclosed by Valyocsik and make the process more flexible to handle a variety of host liquids and contaminants.

Although Valyocsik invention does not specifically disclose the claimed hydrocarbons as contaminants, however, the invention does disclose use of propylene and xylene as the impurity (See Example 29 and 30). Valyocsik further discloses, "Examples of this include contacting a mixture comprising water and at least one hydrocarbon component, whereby at least one hydrocarbon component is selectively sorbed. Another example includes sorption of at least one hydrocarbon component from a mixture comprising same and at least one additional hydrocarbon component" (Column 8, lines 58-63). It is to be noted that "hydrocarbon" encompasses all the claimed components.

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26. Claims 12, 16 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piccoli et al (US Patent 6,118,037) in view of Wismann et al (WO 01/42392 A2) and further in view of Carnell et al (US Patent 6,221,241).

27. With respect to claims 12 and 16, Piccoli invention does not specifically disclose presence of metals in the hydrocarbon liquids, however, the invention does disclose presence of sulfur, nitrogen and oxygen compounds (See column 3, lines 34-47).

Carnell discloses a process similar to Piccoli for removal of sulfur together with other contaminants from hydrocarbon liquids using sorbents (See title; column 1, lines 12-15). Carnell also discloses metallic impurities being removed in the process (See column 1, lines 34-38, 64-67; column 2, lines 1-20).

Thus, it would have been obvious to one skilled in the art at the time of invention to modify Piccoli invention and use hydrocarbon liquids with metallic impurities as disclosed by Carnell and make the process more flexible with a wider range of impurities present in the hydrocarbon liquid feeds.

With respect to claim 41, Piccoli invention does not specifically disclose reduced-valance catalyst metal, however, the metals disclosed by Piccoli comprise reduced-valance metals, as disclosed by Carnell (See abstract; column 3, lines 45-49). It is to be noted that Carnell discloses variable valance metals, which is expected to be similar to the claimed reduced valance metals. It is also to be noted that the percentage of variable valance metal in the finished catalyst is a result-effective variable, it is expected

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to be optimized by one skilled in the art by routine experimentation. See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

28. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Piccoli et al (US Patent 6,118,037) in view of Wismann et al (WO 01/42392 A2) and further in view of Dolian et al (US Patent 2,963,441).

29. With respect to claim 44, Wismann invention does not specifically disclose reaction of carbon with metal compounds, however, the invention does disclose that the carbons used are commercially available (See page 4, lines 5-9).

Dolian discloses a process for producing active carbon adsorbent impregnated with similar metals as disclosed by Piccoli (See Dolian: column 1, lines 20-24). Dolian also discloses reaction of carbon with metal compounds in absence of air while the supporting carbon is suspension in such a solvent in which the metal compound is soluble (See column 2, lines 70-72; column 3, lines 1-4, 38-65).

Thus, it would have been obvious to one skilled in the art at the time of invention to modify combined Piccoli and Wismann invention by producing active carbon impregnated with metals, as disclosed by Dolian for an improved adsorptive process.

30. Claims 48 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Piccoli et al (US Patent 6,118,037) in view of Wismann et al (WO 01/42392 A2) and further in view of Stowe (US Patent 5,035,804).

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31. With respect to claims 48 and 49, Piccoli discloses silica gel, zeolite, and inorganic oxides, for example alumina (See column 1, lines 41-44; column 2, lines 20-30, 65-67) as sorbent support, however, the invention does not specifically disclose perlite as a support.

Stowe discloses a process of removing hydrocarbons from water by adsorption over a sorbent including perlite and sand (See abstract).

Thus, it would have been obvious to one skilled in the art at the time of invention to modify combined Piccoli and Wismann invention by producing it would have been obvious to one skilled in the art at the time of invention to modify combined Piccoli and Wismann invention by using perlite as a support for the adsorptive process because it is expected that perlite and silica gel would be functionally similar for adsorbing impurities. Also, since the percentage of perlite in the sorbent composition is a result-effective variable, it is expected to be optimized by one skilled in the art by routine experimentation. See *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PREM C. SINGH whose telephone number is (571)272-6381. The examiner can normally be reached on 7:00 AM to 3:30 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Examiner, Art Unit 1797